DEVICE FOR THE PROTECTION OF A HORSE'S HOOF

The present invention relates to a device for the protection of a horse's hoof, having the form of a sole fixed by cementing to the lower surface, which bears on the ground, of the hoof and which is a substitute for a horseshoe.

For many years, horseshoes made of metal no longer give satisfaction. Thus, horseshoes are adapted to protect the hoof, in particular the horny wall of said hoof, this part corresponding to the part of the hoof adapted to bear against the ground. However, the hoof constitutes the equivalent of a nail on which the horse walks. Because it constitutes a nail, this hoof is subjected to regular growth. As a result, it is necessary to shod and unshod frequently horses in the case of racehorses to have shoes best adapted to the shape of a hoof. The repetition of these operations of shodding and unshodding, which requires each time the use of nails, gives rise to rapid damage of the horny wall of the hoof. Moreover, horseshoes are conventionally made of steel, aluminum or other metals. Because of this, shoes known today have a high weight which limits the speed and freedom of movement of the horse and which moreover offers a rigidity which prevents the absorption of shocks and is an obstacle to the mobility of the hoof, which gives rise to a certain number of pathologies such as tendonitis and microtraumatisms.

Developments which have taken place in the course of recent years have thus had the object, either to lighten horseshoes, particularly with the appearance of aluminum shoes, or to overcome the nailing operations by fixing such aluminum shoes by cementing.

To solve the pathologies observed in horses, it has also been proposed to insert, between the horseshoe and the lower surface of the hoof, a shock absorbing sole as shown in particular in the patent EP 1 095 562. Other examples of soles for horses are particularly described in the patents FR 2 575 033, U.S. 4,573,538, U.S. 6,082,462 and EP 0 823 209.

All the solutions examined up to the present have again numerous drawbacks connected to the fact that they do not take completely into consideration the anatomy of the horse's hoof, which requires maintaining the lower surface of the hoof sufficiently free to permit relative movement of the different elements constituting the hoof.

An object of the present invention is thus to provide a protective device for a horse's hoof of great lightness so as to permit a greater frequency and greater flexibility of the movements of the horse, which permits improving its performance.

Another object of the present invention is to provide a protective device for a horse's hoof whose design permits, by reason of its shock absorbing properties, to limit, even to overcome the pathologies such as tendonitis, observed in horses.

Another object of the present invention is to provide a device for the protection of a horse's hoof whose design permits deformation of the horny wall under pressure, not only in a horizontal direction but also in a vertical direction, engendered by movements of the horse, which also contributes to avoiding the various pathologies set forth above.

Another object of the present invention is to provide a protective device for a horse's hoof whose design permits

avoiding damage to the hoof caused by frequent changes of shoes fixed by nails, by means of securement by cementing, which is non-destructive of the horny wall of the hoof.

Another object of the present invention is to provide a protective device for a horse's hoof whose design permits obtaining a product perfectly adapted to the shapes and dimensions of the horse's hoof to be thus equipped.

To this end, the invention has for its object a device for protecting a horse's hoof having the shape of a sole affixed by cementing to the lower surface that bears against the ground, of the hoof and which substitutes for a horseshoe, characterized in that said sole, made of a synthetic material of low density, is for at least a portion of said sole, constituted by the superposition of at least two layers of material of different hardnesses, one of the layers, of greater hardness to resist wear and abrasion, constituting the surface that bears on the ground of said sole, another layer, adapted to come into contact with the hoof, having lesser hardness to constitute a layer for damping and/or shock absorbing, the assembly permitting accommodating natural deformations of the horny wall of the hoof.

Thanks to the provision of the sole adapted to be a substitute for a horseshoe in a stratified form comprising, for at least a portion of the sole, at least two layers of different hardness, there results a lightweight product, resistant to wear and abrasion whilst having shock absorbing and flexibility characteristics which permit accommodating the natural deformations of the horny wall of the hoof.

The invention will be fairly understood from a reading of the following description of examples of embodiment, with reference to the accompanying drawings, in which:

Figure 1 is a partial perspective view of a protective device according to the invention, positioned upside down and in which the layers have been shown transparent to illustrate their superposition;

Figure 2 is a top plan view of a blank serving for the production of the sole; and

Figure 3 is a cross-sectional view of the sole shown in Figure 1.

As mentioned above, the protective device for a horse's hoof, according to the invention, has the form of a sole 1. This sole 1 is adapted to be fixed by cementing to the lower surface, which bears on the ground, of the hoof and to be a substitute for a horseshoe. As a result, the presence of a horseshoe is no longer necessary.

This sole 1 is made of a low density synthetic material. At least a portion of this sole 1 is present in the form of a stratification constituted by a superposition of at least two layers, 2, 3 of material of different hardnesses. One of these layers, shown at 2 in the drawings, constitutes the bearing surface against the ground of this sole 1. This layer has a greater hardness to resist wear and abrasion. Preferably, this lower layer 2 that bears against the ground, of the sole 1, has a hardness comprised within the range of Shore A40 to Shore D50.

Another layer 3 of the sole, adapted to come into contact with the hoof, has lesser hardness to constitute a damping and/or shock absorbing layer. This layer 3, called the upper layer, in contact with the hoof, is preferably in

the form of an expanded foam microstructure. The presence of this foamed microstructure permits this layer on the one hand to constitute a surface for adherence of the cement, and on the other hand thus has a lower density permitting obtaining a sole of more reduced weight. Each layer 2, 3 is preferably made of an elastomeric material selected preferably from the group of compounds including polyurethanes.

To produce the sole 1, a blank 8 is produced in large numbers by molding, preferably by injection of the layers 2 and 3, one of the layers being preferably injected onto the surface of the other layer. In this case, the production takes place in two steps. A first layer is thus produced, then the second layer is injected onto the surface of the first layer. The sole could also be produced in an analogous manner by co-injection of said layers 2 and 3. It could also be envisaged to produce the layers in separated form and then to assemble them by means of a suitable binder.

This blank 8 is then cut out to be shaped and dimensioned so as to cover a plurality of sizes of the sole 1. Thus, as shown in Figure 2, it is possible, from a same blank 8, to cut out from said blank a sole whose shapes and dimensions are a function of the desired size. Figure 2 thus shows the different possibilities of production of the sole by cutting out the blank. There can thus be covered a large range of sizes of soles. The cutting out of this mass produced blank 8 can be carried out by punching, by cutting with a water jet, by laser cutting or by any other suitable means. The possibility of cutting out a blank 8 to obtain the sole 1 permits adapting it best to the

morphological characteristics of each horse's hoof. There is thus obtained a tailor made sole.

In the illustrated examples, the sole 1 is present in the form of a structure open in its central portion whose peripheral external edge is shaped to follow the external contour of the hoof at least over a portion of this contour. The recess is represented at 7 in the drawings. The inner periphery of the sole delimiting this recess 7 is itself adapted to the interior shape of the hoof. In the illustrated examples, this sole 1 is a structure open in its central portion, and closed of general annular shape. Thus, this sole 1 has the shape of an arc of a circle in a manner like the shape of a conventional horseshoe, the free ends of this arc of the circle being adapted to be connected together to permit the closing of said structure. The portion 4 of the sole 1, which corresponds to the closure region of the sole and which is adapted to extend in line with the fork of the hoof, is made in the form of a single layer corresponding to the layer 2 that bears on the ground, of greater hardness, of said sole. This portion 4 of the sole, adapted to extend in line with the fork of the hoof, can be in the form of a separable portion at the time of applying the sole. This portion can however be preserved. It thus permits a deformation of the sole whilst maintaining this deformation within a predetermined range of deformation and thus gives a supplemental holding effect to the assembly of the sole. The sole can also be made in the form of a piece which is an open arc of a circle in a manner analogous to a conventional horseshoe.

This sole 1 also comprises, on its surface adapted to come into contact with the hoof, at least two grooves 5 that converge. Each groove 5 serves for the reception of a

securement member called a pinch in the field of horses. This pinch, resembling a pincher with two resiliently deformable legs, serves for the securement of the sole 1 to the wall of the hoof. Such a pinch is already known in the art in coaction with a horseshoe.

To facilitate the adherence of such a sole to the ground, the layer 2 that bears on the ground of said sole 1 is shaped in the form of cramps 6 improving the adherence of said sole to the ground. Of course, the cramps 6 can have diverse and varied shapes.

Once the sole 1 is cut out from the blank 8, this sole 1 is fixed to the hoof by cementing, which renders the emplacement of this sole extremely easy. Generally, the sole 1 is fixed to the hoof by an acrylic cement, preferably bi-component.